



MB-4K

User Manual

Version 1.3

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1 Introduction

1.1 Purpose

This document provides guidance about the Doremi MB-4K product.

1.2 Presentation

This document is structured according to the following sections:

- **Section 1:** Introduction – Overall presentation of the document
- **Section 2:** MB-4K Presentation – Usage and characteristics of the MB-4K product
- **Section 3:** Rear Panel Connections – Presentation of the MB-4K rear panel connections
- **Section 4:** MB-4K Setup – Description of the setup/configurations supported.
- **Section 5:** MB-4K Macros – Description of the Macro supported.
- **Section 6:** Document Revision History

2 MB-4K Presentation

2.1 Overview

MB-4K allows to decompress the 4K components of a 4K composition coming from the Doremi DCP-2000 Digital Cinema Server and transmit the 2K and 4K components to any 4K projector.

It also render subtitles and overlay them on the output pictures. Subtitle rendering necessitate the MB-4K and the DCP-2000 to be on the same network and the DCP-2000 to be configured to send the subtitles to the MB-4K IP address.

The unit has been designed to be rack-mounted. Its dimension is 1RU.

2.2 Support Formats

The following video input formats are supported :

- 2K progressive 4 :4 :4 12bits at 24fps on Dual-Link HD-SDI
- 2K progressive 4 :2 :2 10bits at 24fps on HD-SDI link A

The following video output formats are generated :

- 2K progressive 4 :4 :4 12bits at 24fps Dual-Link HD-SDI
- 2K progressive 4 :2 :2 10bits at 24fps single link HD-SDI on both link A and B.

See section 4.5.5 for more information.

2.3 MB-4K Front Panel

The front panel has one green LED showing when the unit is ON and a power switch to turn the unit On and Off.



Figure 1: MB-4K Front Panel

2.4 Users of the MB-4K Cine

The MB-4K Cine has a host processor. The host is a linux based operating system with the following predefined users:

- **root** user
- **admin** user, with the password **1234**
- **manager** user, with the password **password**
- **doremi** user, with the password **doremi**

3 Rear Panel Connections

The rear panel allows you how to connect the unit to the power outlet (110VAC / 60 Hz or 220VAC/50Hz).

The following connectors are available:

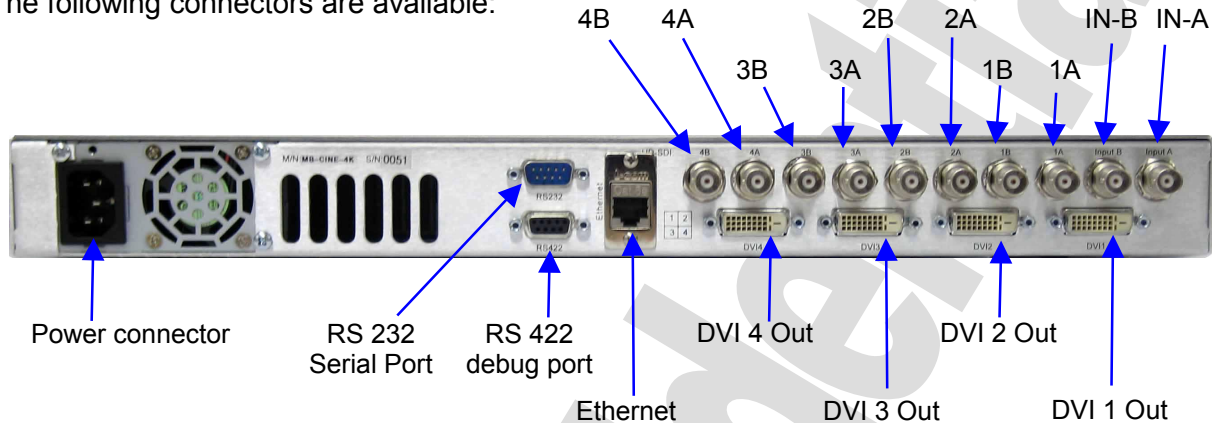


Figure 2: MB-4K Rear Panel Connectors

The HD-SDI connectors description is provided below:

Connector	Description
4B	HD-SDI output connector : Bottom right, Link B
4A	HD-SDI output connector : Bottom right, Link A
3B	HD-SDI output connector : Bottom left, Link B
3A	HD-SDI output connector : Bottom left, Link A
2B	HD-SDI output connector : Top right, Link B
2A	HD-SDI output connector : Top right, Link A
1B	HD-SDI output connector : Top left, Link B
1A	HD-SDI output connector : Top left, Link A
IN-B	HD-SDI input connector : Input, Link B
IN-A	HD-SDI input connector : Input, Link A

The Serial connectors description is provided below:

Connector	Description
RS 232	RS232 port to connect to the host. The port settings are : 38400 bauds, 8 data bits, no parity, 1 stop bit, no flow control. Use a Null Modem serial cable to connect from a PC.
RS 422	RS 422 port used for debug messages. The port settings are : 115200 bauds, 8 data bits, odd parity, 1 stop bit, no flow control. Use a RS232 to RS422 serial cable (also called at Doremi V1 to PC cable, provided with the unit) to connect from a PC.

4 MB-4K Setup

4.1 Connecting via ethernet with ssh

When connecting via Ethernet using ssh, you should connect as the *admin* user:

```
ssh -l admin 10.10.1.26
```

enter the admin password when prompted

4.2 Changing the IP address

The default IP Address is 10.10.1.26.

To change the IP address you need to connect as *admin* to the unit via Ethernet with a *ssh* connection or via the RS232 serial port, using an application like the HyperTerminal.

Next, you need to execute the following commands from the *terminal* command prompt:

```
type: /doremi/sbin/adminconf.out <enter>
```

This command will start a GUI-like application. Follow the instructions and set the IP address to the desired value.

4.3 Updating

To update the unit, copy via ftp the provided update package in the */doremi/etc/rc.once* folder. You need to use the *admin* user for the ftp connection. The *admin* default ftp directory is */doremi*. Then reboot the unit (from a ssh connection via Ethernet or from an serial connection via the RS232 port). The unit will be updated during the reboot.

Note 1: Initial firmware (until version MB 0.01i) has a known bug to update only if a video signal is fed to the HD-SDI Input.

Make sure to have video fed from the DCP-2000 when doing an update.

Note 2: Only do 1 update at a time. If you need to update both the firmware and the software, do one first, wait for the reboot to be finished before doing the update for the second one. If you update both at the same time (copy both update package in */doremi/etc/rc.once* before rebooting), the software update might not be done properly.

Note 3: Downgrading: the firmware can be downgraded if necessary. However the software can only be downgraded safely within the same version branch (for example between any firmware with version 0.1.1-x). Downgrading software from one branch to the other (for example from version 0.1.1-x back to version 0.1.0-x) is not supported and can lead to unexpected results.

4.4 Report generation

The unit generate from log files while running. If you encounter an issue, you need to generate a report. This report will contain the log files and some information on the current state of the unit. It will help the technical support team to identify the issue.

To generate this report, connect to the unit as *admin* with Ethernet with a *ssh* connection or with the RS232 serial port and execute the following command:

type: `/doremi/sbin/report.sh` <enter>

This will generate in directory `/doremi/tmp` a file with name `drmreport_YYYY-mm-dd.tgz` where `YYYY` is the year, `mm` is the month and `dd` is the day. For example:

`/doremi/tmp/drmreport_2007-08-16.tgz`.

Send this file to the technical support team when contacting them.

4.5 Configurations

4.5.1 Boot configuration files

Configuration files can be present to specify a configuration different that the default one to be used at boot time. Those files, when present are used during the boot sequence to set the unit accordingly. Change those file will only take effect after the next reboot of the unit.

Such files are text file present in directory `/doremi/etc/beluga`

To change or create a configuration file, use the following procedure:

- connect to the MB-4K via Ethernet using a *ssh* connection or via the RS232 serial port
- run the `beluga_conf` application with the configuration file name and the value to set it to as 2 parameters (in that order) :
 - `/doremi/bin/beluga_conf configuration_file_name value`

See the following sections for the allowed configuration names and value associated.

Note 1: configuration file names are case sensitive.

Note 2: those configuration files and setting method are used since software 0.1.2-8.

4.5.2 Manual configuration

The different configurations can be set manually at anytime, taking effect immediately. Those configurations will be lost at the next reboot though. Most configurations for the output are set with a bit in register 0x00. The general way to change a setting is the following procedure:

- connect to the MB-4K via Ethernet using a *ssh* connection or via the RS232 serial port
- run the `beluga_app` that you can find in the `/doremi/sbin` directory :
 - `/doremi/sbin/beluga_app`

- Change the bit n (for example bit 3 : 0x08) of register 0x00 from 0 to 1. It is recommended first to read this register and to write the proper modified value. For example:
 - r 00
 - This will return for example: 0000 CTRL 00000010
 - w 00 18
 - here in our example we change bit 3 = 0x08 to set it to 1
 - r 00
 - This will now return in our example: 0000 CTRL 00000018

4.5.3 2K All Outputs

By default the MB-4K output a 4K image (4096x2160) split in 4 separate 2K (2048x1080) quadrants:

- the top left quadrant on output 1,
- the top right quadrant on output 2 ,
- the bottom left quadrant on output 3,
- the bottom right quadrant on output 4.

In the case of a 2K video coming in, the 2K image will be up-scaled to a 4K image.

The MB-4K can be configured to output only the 2K image coming in on all outputs.

The configuration file for this setting is file "2K_allOutput" in /doremi/etc/beluga, see Boot Configuration Files.

The values accepted are:

- 0: for 4K output
- 1: for 2K output on output 1 only.

The manual configuration bit is bit 2 (0x04) in register 0x00, set to value 0 for 4K output and to value 1 for 2K output, using the procedure described above in Manual Configuration.

4.5.4 2K output

By default the MB-4K output a 4K image (4096x2160) split in 4 separate 2K (2048x1080) quadrants, see 4.5.3 above.

The MB-4K can be configured to output only the 2K image coming in on output 1. In that configuration, the other output should be discarded.

The configuration file for this setting is file "2K_output" in /doremi/etc/beluga, see Boot Configuration Files.

The values accepted are:

- 0: for 4K output (if “2K All Outputs” not set)
- 1: for 2K output on output 1 only.

The manual configuration bit is bit 3 (0x08) in register 0x00, set to value 0 for 4K output and to value 1 for 2K output, using the procedure described above in Manual Configuration.

4.5.5 3D/48fps Output

The MB-4K only output a 24fps signal. When the MB-4K receives a single link 4:2:2 10b YCxCz video on input A, it automatically goes into a 3D/48fps mode. In this mode, only the input A is taken into account.

Starting with firmware version MB 0.01k, there are 2 outputs possible in this 3D/48fps mode:

- 4:2:2 10b YCxCz single link output at 24fps on each output A (copied on the corresponding output B). This is the default mode.
- 4:4:4 12b XYZ dual link at 24fps on output A and B combined

The configuration file for this setting is “3D_444_output” in /doremi/etc/beluga, see Boot Configuration Files.

The values accepted are:

- 0: 3D 4:2:2 10b YcxCz outputs
- 1: 3D 4:4:4 12b XYZ outputs

The manual configuration bit is the bit 4 (0x10) of register 0x00 to 1 (4:4:4 XYZ) or 0 (4:2:2 YCxCz) using the procedure described above in Manual Configuration.

Note 1: Until firmware MB 0.01j (included) only the 4:4:4 12b XYZ output mode was supported.

Note 2: in 2D (24fps) mode, the output is always 4:4:4 12b XYZ dual link.

Note 3: To support a 4K 3D output or a 4K 48fps output, you need to use 2 MB-4K in parallel.

4.5.6 Input links

Starting with firmware version MB 0.01k, the MB-4K auto detected which input (A or B) is the main link (link A) of the Dual Link HD-SDI input, and which is the second link (link B).

When receiving a 3D/48fps single link 4:2:2 10b YCxCz video, the MB-4K always take into account only the input A.

This allows to use the same connections for both 2D (24fps) and 3D (48fps) configuration when using 2 MB-4K to support 3D (48fps) playback, as shown in Figure 3:

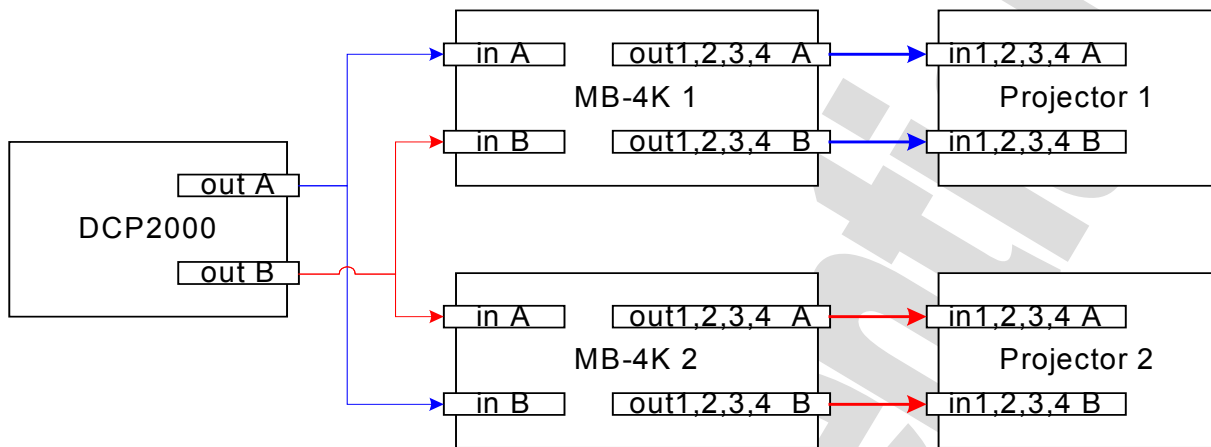


Figure 3: 3D/48fps Configuration using 2 MB-4K

In the configuration shown in **Figure 3**, the second MB-4K is connected to the DCP-2000 with the input inverted. The output of each unit is shown in **Table 1**.

	4:4:4 XYZ DualLink input (2D 24fps)	4:2:2 YCxCz SingleLink Input (3D/48fps)
MB-4K 1	4:4:4 XYZ 4K at 24fps	4K left eye/even frames at 24fps
MB-4K 2	Same as MB-4K 1	4K right eye/odd frames at 24fps

Table 1: Output of each Unit in a 2 Units Configuration for 3D Support

Note: on version until MB 0.1j included, the main link (link A) is always input A.

5 MB-4K Macros

The unit can be configured from a DCP-2000 via the sending of Macro during a ShowPlayList. This configuration would be similar to the Manual Configuration described above for the supported configurations.

The supported Macros are described in the following sections.

5.1.1 How to use Macros on DCP-2000

Please refer to the DCP-2000 documentation (Field Installer and Operator manuals) for more information on how to make and use Macros on the DCP-2000.

5.1.2 SET_MB_ALL2K

This macro sets the “2K All Outputs” mode, as described in section 4.5.3.

5.1.3 SET_MB_4K

This macro resets the “2K All Outputs” mode and the “2K Output” mode to be in 4K output as described in section 4.5.3 and 4.5.4.

5.1.4 SET_MB_2K

This macro sets the “2K Output” mode, as described in section 4.5.4.

5.1.5 SET_3D_444

This macro sets the 3D 4:4:4 12bits output mode, as described in section 4.5.5.

5.1.6 SET_3D_422

This macro sets the 3D 4:2:2 10bits output mode, as described in section 4.5.5.

5.1.7 SET_OFFSET

This macro sets an horizontal and a vertical offset used to move the position of the generated subtitles.

This macro usage is :

SET_OFFSET <x> <y>

where <x> is the horizontal offset to apply, and <y> is the vertical offset to apply.

This can be used in a 3D setup to move the subtitle of each MB-4Ks left or right in order change the depth at which the subtitles are seen by the viewer.

6 Document Revision History

Date	Version	Description
07/16/2007	1.0	First version
08/16/2007	1.1	Support for admin ssh and configuration of Ethernet (soft 0.1.1-10 and later)
10/11/2007	1.2	Support configuration files (soft 0.1.2-8 and later)
07/17/2008	1.3	Support Macros and 2K All output.